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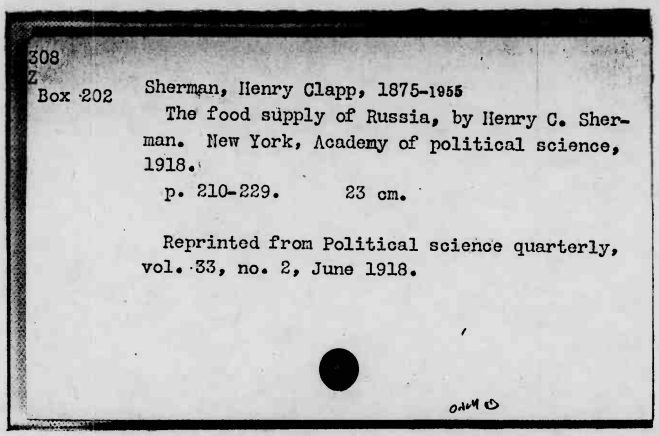

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THE FOOD SUPPLY OF RUSSIA

BY
HENRY C. SHERMAN

REPRINTED FROM POLITICAL SCIENCE QUARTERLY
VOL. XXXIII, NO. 2, JUNE, 1918

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THE FOOD SUPPLY OF RUSSIA[1]

THE outstanding feature of the food situation in Russia, both in normal years and at the present time, is the predominant place occupied by the bread grains, wheat and rye. The Russians devote most of their cultivated land to the raising of bread grain, and derive a larger proportion of their nutriment from bread than does any other nation, so far as known, and the government records show much fuller statistics of grain production than of any other crop. But this is not to imply that the Russian any more than other people would be able or willing to live on bread alone, or that the other crops are to be ignored in a study of the food supply of Russia.

It is now well recognized that a satisfactory food supply must furnish: (1) adequate energy or fuel value—in other words, enough calories, (2) enough protein of suitable sorts, (3) sufficient amounts and proper proportions of the various mineral elements or ash constituents, (4) enough of those substances, not yet chemically identified but known to be necessary to normal nutrition, the food hormones or so-called vitamines.

Perhaps one may best combine convenience of discussion of the main types of food materials with recognition of the nutritive significance of each, by grouping them somewhat as follows: (1) Breadstuffs and other grain products, the most prominent sources of energy in the diet, important also as sources of protein, but less satisfactory as sources of the mineral elements and vitamines; (2) meats and fish, important as sources of protein and fat, adding thus in significant degree both to the protein content and the energy value of the dietary; (3) vegetables and fruits, which vary greatly in their protein and

[1] The gathering of the data on which this paper is based was the joint work of Mr. Harold H. Swift and the writer, as members of the American Red Cross Mission to Russia in the summer of 1917. In this work we were ably assisted by Mr. W. C. Nicholson and Mr. A. J. Schon. Although the paper was written in January 1918, publication was unavoidably delayed.

energy values but are all important as sources of mineral matter and vitamines; (4) milk, important in all of these respects and possessing unique value as a growth-promoting food.

The Grain Crops

Wheat and Rye. Wheat and rye are best studied together because they are used interchangeably as bread grains by the Russian people. It is true that in normal times before the war wheat was largely exported and rye was not, so that the two crops were apt to be regarded as differing materially in commercial status; but it must be kept in mind that while rye itself is not exported to any great extent, the amount of wheat available for export in any given year depends not upon the wheat crop alone but rather upon the combined crops of wheat and rye, because any deficiency of the rye crop would in general mean an increased home consumption of wheat in order to meet the bread needs of the people.

In the past, rye has been more prominent than wheat in the diet of the Russian people, and especially of the peasants. This may have been due, as implied by most writers, to a preference for rye on the part of the peasants, or it may be more accurately attributable to the fact that wheat commands a better market for export and that only the south central parts of Russia have a climate well adapted to wheat culture, whereas rye is successfully grown over a much larger part of the country. Recently, however, the per-capita consumption of wheat in Russia has increased, while that of rye has remained stationary or has declined. The amounts of wheat consumed per person were: in 1894–99, 1.82 bushels; in 1900–1905, 2.46; in 1911–1913, 2.86; while for rye the corresponding amounts were 4.76, 4.78 and 4.47 bushels, respectively. It would seem that for Russia as a whole, the use of wheat as a bread grain must have been gradually gaining upon that of rye, and as at least six-sevenths of Russia's population is still rural, the increasing use of wheat can hardly be attributed entirely to the preference of the townspeople. Plainly the Russians generally will use wheat and rye interchangeably as bread grains, and, recently at least, with no special preference for the rye. The

amount of wheat available for export (or storage) will therefore depend upon the extent to which the combined crops of wheat and rye exceed the amount needed for bread-grain by the Russian people, and the amount required for seed for the succeeding crop. In general the seed requirement in Russia averages one-sixth of the crop. The crops for recent years as reported in Russian official publications have been as follows:[1]

	WHEAT BUSHELS	RYE BUSHELS	WHEAT AND RYE BUSHELS
1911 . . .	561,724,800	715,165,600	1,276,890,360
1912 . . .	798,993,240	977,718,060	1,776,711,300
1913 . . .	1,024,452,060	940,946,760	1,965,398,820
1914 . . .	831,034,920	809,944,760	1,640,179,680
1915 . . .	824,201,760	846,627,060	1,670,828,820
1916 . . .	524,924,100	739,364,100	1,264,288,200

The corresponding statistics of exports are:

	WHEAT BUSHELS	RYE BUSHELS	WHEAT AND RYE BUSHELS
1911 . . .	144,337,000	32,324,400	176,661,400
1912 . . .	96,612,000	18,357,600	114,969,600
1913 . . .	121,953,600	23,682,000	145,635,600
1914 . . .	88,332,000	14,004,000	102,336,000
1915 . . .	6,660,000	3,481,200	10,141,200

For the year 1916 no statistics of exportation were available when the writer left Petrograd early in September 1917, but it is probably safe to assume that the volume of exports for that year was so small as to be well within the probable error of the crop estimates.

In view of the fact that before the war Russia exported large quantities of wheat, it seems to be commonly assumed that after the practical stoppage of exportation, great stores of the grain must have accumulated. One hears the assumption of "bursting granaries in the South" even though, through

[1] In Russian publications these and practically all other crops are reported in poods. One pood equals 40 pfunts ("Russian pounds") or 36 pounds avoirdupois. As we are now discussing wheat and rye somewhat interchangeably the bushel has here been considered as 60 pounds in the case of rye as well as of wheat. (American statistics commonly consider a bushel of wheat as 60 pounds but a bushel fo rye as only 56 pounds).

difficulties of transportation, the cities of northern Russia may be suffering for bread. Are such assumptions justified? The intensive wheat region, which may be roughly described as lying south and east of Moscow in European Russia, produces far in excess of its own needs, local consumption taking hardly half of the crop. The greater share of the surplus of this region is, however, needed to supply bread for the inhabitants of other parts of Russia; so that the amount available for export to other countries is far less than the local surplus of the wheat-belt. Formerly Russia exported about 25 per cent of her wheat crop; but the growth of population together with the increased per-capita consumption of wheat during the twenty years preceding the war resulted in an increasing proportion of the crop being consumed at home, so that in the three-year period 1911 to 1913 inclusive only 15 per cent of the wheat grown in Russia was exported. Of the combined crop of wheat and rye, nine-tenths were used at home and only one-tenth was sold abroad, so that a diminution of one-tenth in the production, unless accompanied by decreased consumption, would afford no surplus for exportation or storage. It has therefore seemed worth while to carry through a calculation of the probable needs of the growing population of Russia during the past six years in comparison with the amounts of grain available according to the above official data of production and exports. The result may here be given without the details.

The population of Russia for the years in question is given by the Central Statistical Committee of the Russian Ministry of the Interior as follows:

1911.	163,919,000
1912.	167,919,000
1913.	170,903,000
1914.	175,138,000
1915.	178,905,000

For 1916, in view of the occupation of considerable territory by the enemy, we assume for purposes of calculation a population of 175,000,000.

Since 1913 is the last complete year not affected by the war,

the three-year period 1911–1913 inclusive has been taken as a basis for estimating normal per-capita consumption. It has already been stated that during these years the average amounts consumed were 2.86 bushels of wheat and 4.47 of rye or 7.33 bushels of the two grains combined. This is for consumption in the stricter sense. Adding the grain required for seed, the estimated normal home requirement becomes 9 bushels per capita of population. Since the crop of 1911, less the exports of that year, leaves an amount much less than this estimated need, it is probable that the carry-over from 1911 to 1912 was very nearly nil. The crop of 1912, however, after deducting for exports and allowing for normal consumption, leaves an estimated carry-over of about 50,000,000 bushels. A continuation of the same method of calculation (and the same assumption as to normal need) through the succeeding years would bring us to the conclusion that in January 1917 there would have remained in the country only 20,000,000 bushels of wheat and rye, whereas the "visible commercial reserve" officially reported as of February 1, 1917 was 48,695,000 bushels, and the total amount of these grains in the country, in addition to the quantities needed for seed, was doubtless greater than this latter figure. That the actual reserve in the early part of 1917 was larger than estimated by applying the assumptions above noted to the officially reported statistics of production and export, may be explained in at least two ways. (1) Since the government had placed upon grain a maximum price which was not in proportion to the greatly increased cost of the supplies which the farmer must buy, and since the value of the ruble was steadily decreasing, the farmer was naturally inclined to regard his grain as of more worth than the rubles which he could obtain for it; and the temptation to hoard his grain and understate the amount of his crop to avoid having it commandeered by the government must have been very strong. Under these conditions it seems likely that the figures reported for the wheat and rye crops of 1916 may have been somewhat below the amounts actually harvested. (2) In view of the shortage of flour and the introduction of card systems to regulate the amount of bread which any one family might buy, as

well as the milling of a higher percentage of the wheat kernel into bread flour, and a growing tendency to substitute barley for part of the wheat or rye in breadmaking, it is probable that the per-capita consumption of wheat and rye during 1916 was somewhat lower than the rate assumed as normal on the basis of conditions existing before the war.

It is therefore quite possible that there may have existed in Russia before the harvest of 1917 considerably more wheat and rye than the reported "visible reserve" of 48,695,000 bushels; but it appears very improbable that there were any such vast stores of wheat as many people seem to have assumed.

How the 1917 crop compares with the needs of the population for the year 1917–1918 it is not possible to say. When the writer left Petrograd on September 11, only fragmentary crop reports had been received, and in view of disturbed conditions during the autumn months it seems doubtful if accurate and comprehensive statistics for 1917 will ever be obtainable. But enough was known of the condition of the crops at the time of harvest and of the diminution of acreage due to scarcity of labor, abnormal economic conditions and agrarian unrest, to warrant the conclusion that her 1917 crop was little if at all in excess of Russia's needs for home consumption.

The Oat Crop of Russia averages, like that of the United States, around 1,000,000,000 bushels per year; but in Russia the oat crop is so strictly devoted to horse feeding and so little of it comes, or can come, into human consumption that it would be misleading to include it in our present summary.

The Minor Grain Crops and Sugar. Perhaps the most striking and fundamental difference between the food industries of Russia and the United States is the relatively small production of corn (maize) in Russia as compared with the huge corn crop of the United States. With us the corn crop is usually about three times the combined production of wheat and rye, while in Russia the production of corn is scarcely a twentieth of the wheat and rye crop. The per-capita production of corn in the United States is about thirty bushels; in Russia, about one-half of one bushel. Less than one-tenth of the American corn crop is directly consumed by man, much the greater part

of it being converted into meat by feeding to farm animals. The corn raised in Russia is mostly used directly as human food.

Official statistics show the following production[1] of barley, buckwheat, maize, millet, rice and sugar in Russia during recent years:

	BARLEY BUSHELS	BUCKWHEAT BUSHELS	MAIZE BUSHELS	MILLET BUSHELS	RICE BUSHELS	SUGAR TONS (SHORT)
1911 . . .	435,206,000	50,743,000	94,837,000	67,301,000	10,255,000	2,070,000
1912 . . .	494,801,000	58,373,000	93,786,000	106,433,000	10,302,000	2,030,000
1913 . . .	598,358,000	54,365,000	83,265,000	98,451,000	7,495,000	1,357,000
1914 . . .	431,264,000	39,798,000	89,814,000	74,310,000	13,806,000	1,495,000
1915 . . .	427,821,000	44,751,000	71,315,000	92,958,000	10,243,000	1,890,000
1916 . . .	335,749,000	53,414,000	*	68,790,000	*	1,633,000

The corresponding data of exports are as follows:

	BARLEY BUSHELS	BUCKWHEAT BUSHELS	MAIZE BUSHELS	MILLET BUSHELS	RICE BUSHELS	SUGAR TONS (SHORT)
1911 . . .	196,979,000	4,314,000	52,573,000	1,060,000	99,000	498,000
1912 . . .	126,531,000	3,905,000	29,539,000	910,920	87,000	424,000
1913 . . .	179,781,000	3,535,000	22,820,000	1,480,000	111,000	162,000
1914 . . .	90,500,000	2,035,000	11,236,000	958,000	93,000	140,000
1915 . . .	304,000	27,000	27,000	*	*	103,000
1916 . . .	*	*	*	*	*	*

* Data not available.

In general it would appear that any decreased production as the result of disturbed conditions and shortage of labor during the first three years of war has been compensated by the decreased exportation so that the amounts of these grains available for home consumption have probably not decreased. On the face of the figures this would appear to be true of sugar as well as of the grain crops, but in Petrograd and several other cities there has been and is a marked shortage of sugar. In fact sugar was the first commodity to be "put on card." This is doubtless due partly to difficulties of transportation, but probably also to two other factors. There has been difficulty in getting the sugar refined, so that the amount reaching the market during the past two years may have been considerably less than the amount reported as produced; and of the available sugar a large proportion has been taken for the use of the

[1] Barley and buckwheat are counted as 48 pounds to the bushel, corn (maize) as 56 pounds, and millet and rice as 60 pounds per bushel.

army, the allowance to the soldiers being doubtless considerably larger than the amount which the same men would have consumed as peasants at home. Thus the standard ration of the Russian soldier at the front includes one-twelfth of a pound of sugar per day, or at the rate of 30 pounds per year, whereas the per-capita consumption of sugar by the whole population of Russia is estimated at from 12 to 20 pounds per year. It is interesting to note that in the years preceding the war the Russian people were exporting sugar while consuming less than one-fourth as much per capita as is consumed by the people of the United States.

The increased use of barley as a bread grain has probably fully made good, so far as actual food value is concerned, any decrease which may have occurred in the sugar supply of the civil population. A considerable proportion of barley flour may be mixed with wheat flour in bread-making without materially influencing the character of the resulting loaf; and admixture of barley flour with rye makes a loaf more attractive and palatable, to the American taste, than the whole-rye bread which of late has been the only alternative usually available in the northern parts of Russia. Practically all the buckwheat raised in Russia is used as human food either in bread-making or ground as *kroupa* (groats) in the preparation of which the milling losses are said to be relatively small.

Kroupa for the grain as milled or *kashia* as served after cooking, is the general term in Russia for such preparations as are commonly called groats, breakfast cereals, or simply "cereals" in English. *Kashia*, however, is not used simply as a breakfast porridge but is also (and more commonly) cooked like rice, sometimes with addition of fat, and served with meat or incorporated in liberal amounts in soups and stews, or eaten with them. Soup and *kashia* often make an entire meal.

Buckwheat is the grain preferred for making *kashia*, but *kashias* are also made from wheat, barley, millet, maize or rice. The readiness of the Russians to use *kashia* in large quantity and to accept it as prepared from any one of several grains, tends to ensure an economical use of all the grain crops for human food. An equal open-mindedness and adaptability in

the use of our various grain crops in the United States would go far to ensure the success of the present campaign for food conservation and especially for the sparing of wheat.

Meats and Fish

In Russia there are vast grazing areas which are so sparsely settled that the difficulty of ascertaining the numbers of animals upon them or the numbers or weights of those killed and consumed locally must be practically insurmountable, so that statistics either of live stock owned or of meat produced in Russia as a whole, must be regarded as subject to a relatively large probable error. The numbers of cattle, sheep and swine which we find officially reported are as follows:

	CATTLE	SHEEP	SWINE
1910.	51,187,000	79,166,000	13,434,000
1911.	51,622,000	78,331,000	14,087,000
1912.	48,896,000	74,066,000	13,508,000
1913.	51,354,000	73,961,000	14,232,000
1914.	52,051,000	72,272,000	15,093,000
1915.	47,657,000	74,847,000	14,543,000

The figures available for the year 1916 cover only European Russia. For this area they show a larger number of cattle than was shown by the census of the preceding year. This, however, is believed by the statistical authorities of the Russian Ministry of Agriculture to be due to improvements in the methods and completeness of the census work rather than to actual increase in the number of cattle. The actual number is probably as large as the 1916 census shows, but there were probably also as many as this in 1915. If, as seems probable, the true number of cattle in Siberia is correspondingly larger than the census for 1915 showed, the total number of cattle in Russia would be about 55,000,000, or about 30 cattle per hundred of population as compared with about 60 cattle per hundred people in the United States. Thus, notwithstanding the fact that Russia is largely a sparsely populated grazing country, the ratio of cattle to people in Russia is only about half as great as in the United States.

Beef Production. Of the total cattle in European Russia, 45 per cent are reported as milch cows; for Siberia the corresponding data are not available. As a very rough estimate it seems probable that the amount of beef produced and consumed in Russia, averaged for the entire population, is about 30 pounds per capita per year.

Mutton. If the assumption made above in regard to the number of cattle may be applied also to sheep, the total number of sheep in Russia may approximate 90,000,000 to 95,000,000, or 50 to 55 sheep per hundred people—about the same ratio as in the United States. At a conservative estimate one would then expect a mutton production of about 7 pounds per capita per year. The mutton supply is probably being better maintained under war conditions than is the beef supply because mutton appears to be less highly appreciated than is beef in Russia and the great demand for meat for the army probably has resulted in a relatively greater sacrifice of cattle than of sheep.

Pork. By the same sort of reasoning as in the case of cattle and sheep we should expect a total of about 18,000,000 swine in Russia and a production of about 6 pounds of pork per capita of population per year. It is of course chiefly because of the large amount of corn which we devote to hog-feeding that the United States maintains over 60 swine per hundred of population while Russia has only 10 or 12.

Our separate estimates of beef, mutton, and pork thus total 43 pounds of meat per capita per year for Russian consumption, which is in substantial agreement with the estimate of 40 pounds published a few years ago by the United States Department of Agriculture in the discussion of the meat situation in the United States.

Generally speaking, very little grain has been fed for meat production in Russia. With exportation of grain stopped by the war, the question naturally arises whether the grain which would normally have been exported is now being fed for meat production instead. So far as we can find, this is not being done, at least not to any important extent. The decreased production and heavy demands of the army seem to have very nearly offset the decreased exportation, so that the country does

not have any considerable surplus of grain over its needs for human consumption. If this is true it must follow that until conditions are such as to make possible a general advance in agricultural production, it would be difficult if not impossible for Russia to increase her per-capita production or consumption of meat without sacrifice of breeding stock.

Fish. The fish industry of Petrograd has been studied and reported in detail;[1] for the rest of Russia we have approximate estimates. According to the Russian official statistics of 1913 the consumption was equivalent to 9.3 pounds per capita, while Veberman's estimate corresponds to about 14 pounds of food fishes per capita of population per year. While fish is naturally more abundant in the coast regions, yet on account of the many rivers in Russia there is a considerable diffusion of the fish supply throughout a very large proportion of the whole country so that fish constitutes for the people in general a considerable supplement to the meat supply.

Poultry and Eggs. Except for the lack of quick transportation, conditions in Russia would seem to be favorable to poultry culture, and before the war there was a considerable export trade in eggs, but we have been able to find no statistics of total production or consumption. In Petrograd before the war eggs were consumed at about the same rate as in the United States—about 4 or 5 eggs per capita per week. But before the middle of 1917 no one was permitted, even at the height of the egg season, to purchase in excess of this rate, which was certainly much more than the per-capita consumption for the entire population of Russia, for in the past the peasants have generally been too poor to be able to eat a proportionate share of the eggs which they produce. At present on account of the difficulty experienced by the peasant in purchasing his supplies, and his unwillingness to sell his products at prices fixed by the government, it is probable that a larger proportion of the eggs produced and of the fowls killed for food are consumed by the peasants than was formerly the case. Partly for this reason

[1] Veberman. The Fish Supply and Fish Industry of Petrograd. Statistical Department of Petrograd City Duma. Bulletin No. 2, 1917. (In Russian).

and probably to a much greater extent because of failure of transportation, the egg supply of Petrograd has rapidly diminished until in January 1918 it was stated that "the Food Commission has limited eggs to children under 3 years, each child to have four eggs a month. But eggs are not obtainable at any price."

Vegetables and Fruit. Of these crops the only ones regularly included in the official statistics for the country as a whole are potatoes, beans, peas and lentils. The officially reported production of these vegetables in recent years is as follows:

	POTATOES BUSHELS	PEAS BUSHELS	BEANS AND LENTILS BUSHELS
1911	1,172,381,000	26,357,000	10,456,000
1912	1,391,260,000	32,712,000	13,389,000
1913	1,314,774,000	33,593,000	13,264,000
1914	972,780,000	18,462,000	9,127,000
1915	825,447,000	14,172,000	8,861,000
1916	767,400,000	*	*

* Data not available at time of compiling this report.

At the time of compiling these data (September 1917) neither statistics for 1916 nor estimates of the probable crop for 1917 were available in the case of peas, beans or lentils. It was expected that the potato crop in 1917 would be about the same as in the preceding years. It was pointed out by the statistical bureau of the Ministry of Agriculture that the decreased production of potatoes in the immediate past as compared with a few years earlier does not nessarily imply any decrease in the supply available for human food, because the abolition of vodka has resulted in the saving of large quantities of potatoes formerly used for making alcohol. According to the same authority, about 20 per cent of the potato crop is required for seed in Russia. If in the case of peas, beans and lentils the allowance for seed be placed at one-sixth of the crop the amounts of the vegetables here reported available for human consumption under average conditions in Russia would approximate 370 pounds of potatoes and 17 pounds of dried legumes per capita per year. Thus the per-capita consumption of potatoes appears fully one-third higher in Russia than in the United States and in this respect we should do well to learn from the

Russian people, for the higher consumption of potatoes is certainly desirable on both economic and nutritional grounds. Both Russians and Americans would do well to cultivate a higher appreciation and larger use of peas, beans and lentils. The writer was told that dried peas, while not used in very large quantities, are regarded as a staple food in northern Russia but are scarcely used in other parts of the country, and that beans and lentils are little used outside of the southern regions, and are used abundantly only in the Caucasus. As the result of a considerable use of dried legumes in the army during the war, these foods are now becoming more generally familiar, and decorticated peas are beginning to appear in the grocery trade.

Among other vegetables considerably used in Russia but for which no comprehensive statistics could be obtained, beets, cabbage, cucumbers, and onions are perhaps worthy of special mention. It has already been noted that a peasant meal may consist almost solely of soup and *kashia*; the soup is usually either a beet soup (*borsch*) or a cabbage soup (*tschee*)—the former more commonly in the south of Russia, the latter in the north. The three kinds of fresh vegetables other than potatoes which are considered sufficiently important in Petrograd to be recorded individually in the municipal statistics of that city are cabbage, cucumbers and onions, of which the quantities shown by the records correspond to an annual per-capita consumption of 23, 38 and 12 pounds respectively. On account of the difficulty of recording all the vegetables brought into Petrograd by nearby farmers or raised in suburban vegetable gardens and consumed at home, it is not improbable that the actual per-capita consumption may be somewhat higher than these data would indicate. The error from this source, however, is not likely to be serious because the country surrounding Petrograd consists so largely of unproductive salt marshes. The data for potatoes indicate a per-capita consumption of only a little over two bushels per year in Petrograd as against an average of over six bushels for Russia as a whole. If it should be assumed that the per-capita consumption of the other vegetables mentioned is also three times as high for all Russia as is indicated by the

recorded data for Petrograd we should be led to the conclusion that the consumption of cucumbers amounts to an average of over 100 pounds per year for every man, woman and child. Without attaching too much importance to this speculative suggestion, it may nevertheless be emphasized that the cucumber occupies a very prominent place in the Russian dietary. Throughout the entire railway journey from Vladivostok to Petrograd the quantities of cucumbers which were being consumed by both soldiers and employees along the railway, by the people of the towns and villages at which the train stopped,[1] and by the Russian traveling public were, to American eyes, nothing less than astonishing. Raw cucumbers are eaten by the Russians with quite as much relish as Americans eat apples, and apparently in larger quantities, at least during the summer season. In addition to this, salted or baked cucumbers very commonly take the place of potatoes as the accompaniment of meat at the table. The cucumber shares with the cabbage and potato the responsibility for the protection of the Russian from scurvy,[2] a matter of considerable importance since this disease appears to be much more prevalent in Russia than in Western Europe or in America. It seems highly desirable that experimental studies be made of the antiscorbutic property of the cucumber as compared with other vegetables, and of the extent to which (if at all) this property is lost when cucumbers are preserved in brine.

Fruit. As would be expected from the vast extent and varied climate of the country, Russia produces many kinds of fruits and berries, a large proportion of which must be consumed locally and without entering into commercial channels so that

[1] The long stops made by the Russian trains even at small stations permit one to see much more of the life of the people than can be seen in a corresponding journey in America.

[2] In speaking thus of the prevention of scurvy by liberal use of fruits and vegetables it is not intended to prejudge the problem as to how far scurvy is to be regarded as referable to faulty diet and how far infection may be involved. Whatever the cause of scurvy, it seems to be sufficiently established that some foods have antiscorbutic properties. Even if scurvy should prove to be a specific infectious disease it would still remain true that in scurvy as in tuberculosis the nutritive condition and therefore the food supply is an extremely important factor.

statistical estimates must involve large assumptions. The only comprehensive statement regarding Russia's fruit crop which we have seen is that in *The Russian Yearbook*[1] which shows a total corresponding to 30 pounds of fruit per capita of population per year. The fruit as well as the vegetable supply is an important factor in keeping the diet well balanced with reference to its mineral elements and adequate as to antiscorbutic properties. An unfortunate effect of restricting the sale of sugar by the card system has been that householders were unable during the fruit season to secure the extra sugar needed for the canning of fruit and the making of jams and jellies, so that less of these fruit preserves will be available for the people generally this winter than in normal years, and danger of scurvy will be correspondingly increased.

The Milk Supply

No accurate or comprehensive data regarding the total production or consumption of milk or its products in Russia are available. Evidently this is because the dairy industry is not highly developed except in a few districts and the number and productiveness of milch cows kept singly or in small herds by peasant farmers cannot be accurately known. The municipal statistics of Petrograd and Moscow show plainly that the per-capita consumption of milk in these cities is much below the minimum which we regard as satisfactory, but for the country villages, in which the majority of the Russian people live, there are no statistics of milk supply, and one meets some difference of opinion as to whether in general there is a shortage of milk in the rural villages or not. The first Russian peasant meal which the writer happened to see was a mid-day repast consisting of bread and a liberal amount of cottage cheese which was being consumed by a solitary worker in the vicinity of Vladivostok; and at the other extreme boundary of Russia's vast domain, dietary studies of Finnish farmers[2] have shown that milk forms a large part of their daily food. Unfortunately we

[1] London: Eyre and Spottiswoode.

[2] Sundström: Untersuchungen über die Ernährung der Landbevölkerung in Finland. Helsingfors, 1908.

cannot assume that these observations are representative of the food habits of the Russian people as a whole. In accordance with the uniform custom of Russian statistical reports we do not include Finland in giving data either of population or of food production or consumption in Russia. The per-capita milk supply of the Russians generally is certainly very much less than that of the Finns. Judging from the total number of cattle in Russia, and the proportion of milch cows among them as reported by the statistical bureau of the Ministry of Agriculture, it would seem that there might be expected a milk production approximatiug 100 pounds per year per capita of population, but the estimate given us informally by the Ministry of Agriculture corresponds to only 55 pounds per capita. Even accepting the higher of these figures it is evident that milk does not occupy so prominent a place in the diet of the Russian people generally as is desirable from the nutritional standpoint; and since this limited amount of milk is produced and consumed very unequally with respect to population in different parts of the country, it necessarily follows that in some regions there is serious shortage of milk. This is particularly true of Petrograd and to a less extent of Moscow. According to municipal statistics of the summer of 1917, Petrograd received only one-thirtieth of a quart of milk per capita of population per day, and Moscow about one-tenth of a quart, whereas the cities of the United States receive one-fifth to one-third of a quart per capita per day and those who have given most attention to the subject feel strongly that nothing less than the latter allowance can be regarded as really adequate. Without at all minimizing the importance of other factors, such as the direct injury done by the feeding of unsuitable articles of food, the frequency of unsanitary housing among the poor, and the employment of mothers outside of the home, it seems unquestionable that the inadequate amount of milk available to the majority of people in Russia must be one of the chief causes of the high death rate among Russian children, which is more than twice that for corresponding groups in this country. That the results of this inadequacy in the milk supply are no worse than they are is probably due to the fact that Russian children

commonly receive their mothers' milk for a much longer period than is usual in the United States. In the case of Petrograd the difficulties of securing the needed amount of milk in the fresh state appear for the present to be insurmountable. Petrograd normally depends for its supply of milk chiefly upon Finland and the Baltic provinces. The very serious shortage of hay and cattle-feed in Finland and the strained political relations between that country and Russia have had the effect of very nearly cutting off the Finnish supply at the same time that the supply from the Baltic provinces has been greatly diminished by the German invasion and the presence of large numbers of troops in this region. If the German advance on the Riga front has led to the removal of some part of the excess population of Petrograd, it has also cut still further into the milk supply. It seems certain that for some time to come Petrograd must depend for a considerable part of its milk supply upon condensed or dried milk from abroad.

Adequacy of Food Supply to Nutritional Needs

That many parts of Russia are suffering acutely from food shortage is attributed by some to the difficulties of transportation, by others to a production so reduced by labor shortage and agrarian troubles that it would be inadequate even if well distributed. It is obviously of fundamental importance to know how the nutrients supplied by the food available in Russia as a whole will compare with the nutritive requirements of the total number of people to be fed. This involves computing from the amounts and chemical compositions of the various articles of food the quantities of nutrients supplied, and comparing these with the quantities required for normal nutrition as shown by quantitative laboratory investigations. For the purpose of such a comparison it is desirable to state the nutritive value of the food supply in terms of calories, protein, phosphorus, calcium and iron. In order to do this, however, we must assume the quantities of the various food crops which are to be devoted directly to human consumption. If equally accurate statistics of production were available as a starting point, the assumption just mentioned could probably be made with less error for

Russian than for American crops inasmuch as the quantities of grain which might be available for human food but are actually fed to animals instead are very much smaller in Russia than with us.

Practically the entire wheat and rye crops of Russia are milled for human food, but the milling percentages vary with locality and abundance or scarcity of grain and flour at the time. In Petrograd and northwest Russia generally, one sees at present practically nothing but black bread made from flour representing literally the entire rye grain, perhaps mixed with more or less barley. A typical flour mill which we visited near the eastern boundary of the province of Perm, which before the war had produced seven grades of flour, was in 1917 making only whole rye flour, the rye being cleaned only to the extent of the removal of coarse chaff and pebbles. Every 100 pounds of grain as poured from the peasants' sacks was made to yield 98 to 99 pounds of flour, the difference being chiefly due to the mechanical loss of dust produced in the grinding process. Since the crease of the kernel usually contains more or less sand, the flour produced without either scouring the grain or rejecting the bran necessarily makes a bread which is not only black and soggy but also gritty. In some parts of Russia, however, gray or brownish bread made from flour which probably represents 80 to 85 per cent of the grain is available along with the black bread made from whole rye or whole wheat flour. For the purpose of constructing a hypothetical Russian dietary to represent as nearly as may be the average food habits of the entire country, it is here assumed that the wheat and rye flour used for bread the country over will approximate on the average 90 per cent of the entire weight of wheat and rye milled, which as already explained is estimated at seven and one-third bushels per capita per annum. With buckwheat and with rice the milling losses are doubtless larger and with these grains it is assumed that 80 per cent of the weight of the net crop passes into the form of human food. Of barley, maize and millet it is necessary to assume, in addition to the milling losses, that a part of the crop will be fed to farm animals and not all of it devoted directly to human nutrition.

We assume in the table below that barley, maize and millet flours and groats used as human food will approximate 50 per cent of the net weight of these crops. In all cases the necessary allowance for seed has been made in computing the net crop. Of potatoes and legumes it is assumed that practically all the net crop is used for human food. The assumptions which it has been necessary to make in order to arrive at estimates of per-capita consumption of other principal foods have been discussed in the foregoing text. The per-capita consumption of eggs is assumed at one-fourth that of the United States, this being approximately the ratio which appears to exist in the cases of meat and of milk.

HYPOTHETICAL RUSSIAN FOOD SUPPLY PER CAPITA PER YEAR

ARTICLES	WEIGHT POUNDS	ESTIMATED NUTRIENTS				
		CALORIES	PROTEIN GRAMS	PHOSPHORUS GRAMS	CALCIUM GRAMS	IRON GRAMS
Wheat and rye flour [1]	396	645,480	18,720	426	58.1	4.52
Barley products	72	116,280	2,756	64	5.8	0.42
Buckwheat	10	15,800	282	10	1.7	0.05
Cornmeal	12	19,440	504	10	1.0	0.06
Millet	14	22,400	672	15	2.0	0.16
Rice	2	3,180	72	1	. .	0.01
Sugar	13	23,590	.	. . .	. .	. .
Beef and veal	30	21,450	2,108	23	1.2	0.32
Mutton	7	8,500	413	4	0.1	0.06
Pork	6	12,870	216	2	0.1	0.03
Fish	12	5,060	605	7	0.7	0.03
Eggs	6	3,550	321	4	1.6	0.07
Dry beans, peas and lentils	17	26,600	1,734	36	1.3	0.54
Potatoes	370	111,700	2,960	77	17.9	1.74
Cabbage [2]	23	2,780	141	3	4.0	0.10
Cucumbers [2]	38	2,580	119	5	2.3	0.03
Onions [2]	12	2,390	79	2	1.6	0.02
Fruit (as apples)	30	6,420	41	1	0.8	0.03
Milk	75	23,550	1,119	32	41.0	0.08
Vegetable fats and other fat	5	20,400	. .	. . .	. .	. . .
Total for year	. .	1,093,940	32,862	722	141.2	8.27
Per capita per day	. .	2,997	90	1.98	0.39	0.023

[1] Estimated as half wheat and half rye and so milled as to average the same percentages of phosphorus, calcium and iron as do the socalled "entire wheat" flours of the United States.

[2] Petrograd statistics.

Both the number of calories and the quantity of protein per capita of population thus estimated for Russia is almost identical with Taylor's estimate of the food consumption of the United Kingdom. While many of the assumptions which it has been necessary to make in order to arrive at this estimate are individually questionable, yet there seems no good reason to doubt the general conclusion that Russia's food supply is just about sufficient in total food value for the needs of her population provided the food can be properly distributed. While it seems certain that under present conditions Russia can have no very great surplus of food, yet her supply appears sufficient for her own needs as regards calories and ample as regards protein, phosphorus and iron. The estimated calcium content, however, is undesirably low, as is usually the case in communities having a low per-capita milk supply. The Russian diet appears to consist too largely of bread and other grain products, and too little of milk, vegetables and fruit, to be well proportioned. In the United States, according to Kellogg and Taylor, bread furnishes 31 per cent, all grain products 41 per cent of the total calories of the food supply. In France, which shows the largest dependence upon bread of any of the seven countries considered by these authors, bread furnishes 53 per cent and all grain products 58 per cent of the total calories. In Russia if the above estimates are approximately correct, bread furnishes 59 per cent and all grain products provide 66 per cent of the total calories of the food. A larger use of milk and vegetables would certainly improve the character of the diet from the standpoint of the modern chemistry of nutrition and would in all probability greatly reduce the death rate of Russia's children and the scurvy rate among the adults of the northern parts of the country.

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